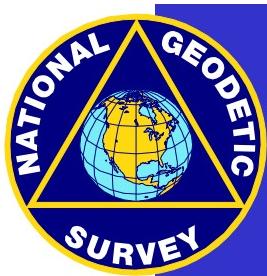


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Continuously Operating Reference Stations

(National CORS)

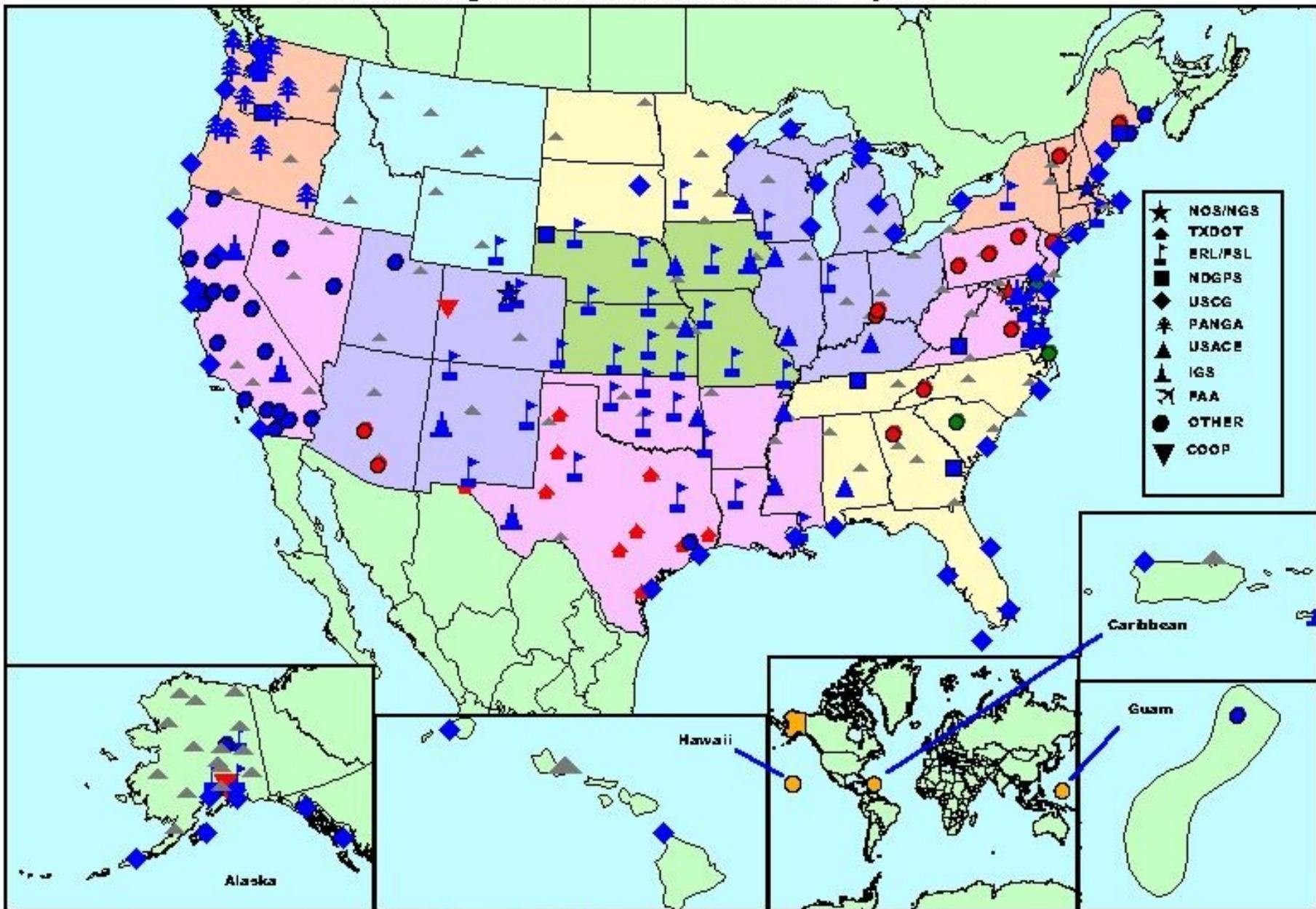
David Minkel
National Geodetic Survey
(NOS, NOAA)



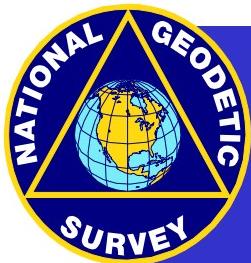
NATIONAL OCEAN
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CORS Coverage in the U.S. and Territories - April 2000



Symbol color denotes sampling rates: (5 seconds) (15 seconds) (30 seconds) (future site)



CORS PRODUCTS

□ RINEX Files

GPS Observables (Pseudorange, Phase, Doppler)

Navigation File (broadcast ephemeris)

□ ITRF97 Satellite Ephemerides

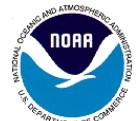
Ultra-rapid [3 hrs; 20-75 cm]

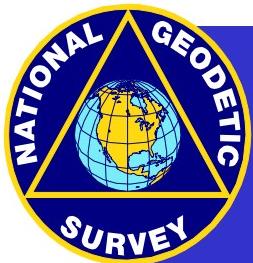
Rapid [16 hrs; 9-11 cm]

Precise [4-7 days; 5-6 cm]

□ Ionospheric Models

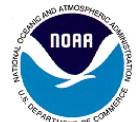
□ Antenna Calibrations





OPUS - Online Processing User Service

- Web-based GPS processing
 - User submits RINEX data to NGS web page**
 - NGS processes data and sends answer to user's email account**
- OPUS uses CORS sites for data source
 - Station position computed from 3 nearest CORS**
 - Position has an RMS based on those three vectors**
- Results
 - 3 hours of data with vector lengths of 172 km, 352 km, & 382 km; position misclosure was 4 centimeters**
- Potential for “commercial” implementations



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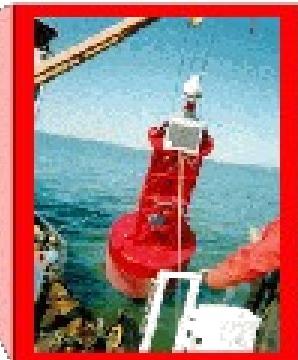
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Height Modernization Initiative

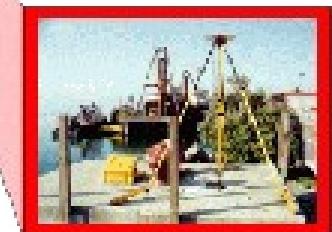
GPS Guided Aircraft Operations



GPS Subsidence Monitoring



GPS Buoy Monitoring Water Levels



GPS Tie to Tidal Bench Marks



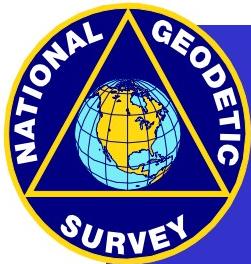
GPS Monitoring of Infrastructures



GPS Controlled Photogrammetry



GPS Positioning of Ship's Pitch, Roll and Sway



Needs / ORD

□ Threshold Requirements

Precision Navigation 10 cm

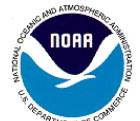
Intelligent Vehicles 10 cm

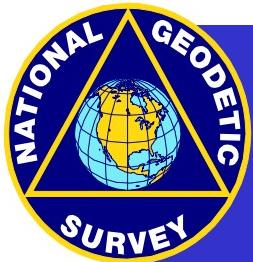
Sediment Surveys 10 cm

Communications 1 nanosecond

□ Objective

Standards Maintenance 1 picosecond





SUMMARY

- CORS is a data archival/dissemination system for GPS carrier phase & code range
- Diverse applications and users
- Post-processing (today)
- Systems view and projections thru 2030 should consider real-time applications of high-accuracy positioning/timing

